

FCC TEST REPORT

Product : TPMS SENSOR
Trade mark : VALOR, DIGITIRE
Model/Type reference : QY1204AC1
Serial Number : N/A
Report Number : EED32J00062801
FCC ID : Z9F-TPMSCA
Date of Issue : May 03, 2017
Test Standards : 47 CFR Part 15 Subpart C (2015)
Test result : PASS

Prepared for:

Shanghai Baolong Automotive Corporation
5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China

Prepared by:

Centre Testing International Group Co., Ltd.
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May 03, 2017

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Lab manager

Check No.:2827502818



2 Version

Version No.	Date	Description
00	May 03, 2017	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Field Strength of the Fundamental Signal	47 CFR Part 15 Subpart C Section 15.231 (b)	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.231 (b)/15.209	ANSI C63.10-2013	PASS
20dB Bandwidth	47 CFR Part 15 Subpart C Section 15.231 (c)	ANSI C63.10-2013	PASS
Deactivated Time	47 CFR Part 15 Subpart C Section 15.231 (a)	ANSI C63.10-2013	PASS

Remark:

The tested samples and the sample information are provided by the client.

N/A:The device is only battery operated, the test related AC mains is not applicable.

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5 General Information

5.1 Client Information

Applicant:	Shanghai Baolong Automotive Corporation
Address of Applicant:	5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China
Manufacturer:	Shanghai Qunying Auto Electronics Co., Ltd.
Address of Manufacturer:	5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China

5.2 General Description of EUT

Product Name:	TPMS SENSOR
Model No.(EUT):	QY1204AC1
Trade Mark:	VALOR, DIGITIRE
EUT Supports Radios application:	315MHz
Power Supply:	LITHIUM BATTERY:1x3V(CR2050W)=3V
AC Adapter:	N/A

5.3 Product Specification subjective to this standard

Frequency Range:	315MHz
Modulation Type:	FSK
Test voltage:	LITHIUM BATTERY:1x3V(CR2050W)=3V
Sample Received Date:	Apr. 11, 2017
Sample tested Date:	Apr. 11, 2017 to May 03, 2017

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	25.1 °C
Humidity:	52 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
TX mode:	The EUT transmitted the continuous modulation test signal at the specific channel

5.5 Description of Support Units

The EUT has been tested independently.

5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 3368 3668 Fax:+86 (0) 755 3368 3385

No tests were sub-contracted.

5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1910

Centre Testing International Group Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories..

A2LA-Lab Cert. No. 3061.01

Centre Testing International Group Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 886427

Centre Testing International Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 886427.

IC-Registration No.: 7408A-2

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A-2 .

IC-Registration No.: 7408B-1

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B-1.

NEMKO-Aut. No.: ELA503

Centre Testing International Group Co., Ltd. has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

VCCI

The Radiation 3 &10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.

Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563.

Telecommunication Ports Conducted Disturbance Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.

The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

5.8 Deviation from Standards

None.

5.9 Abnormalities from Standard Conditions

None.

5.10 Other Information Requested by the Customer

None.

5.11 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

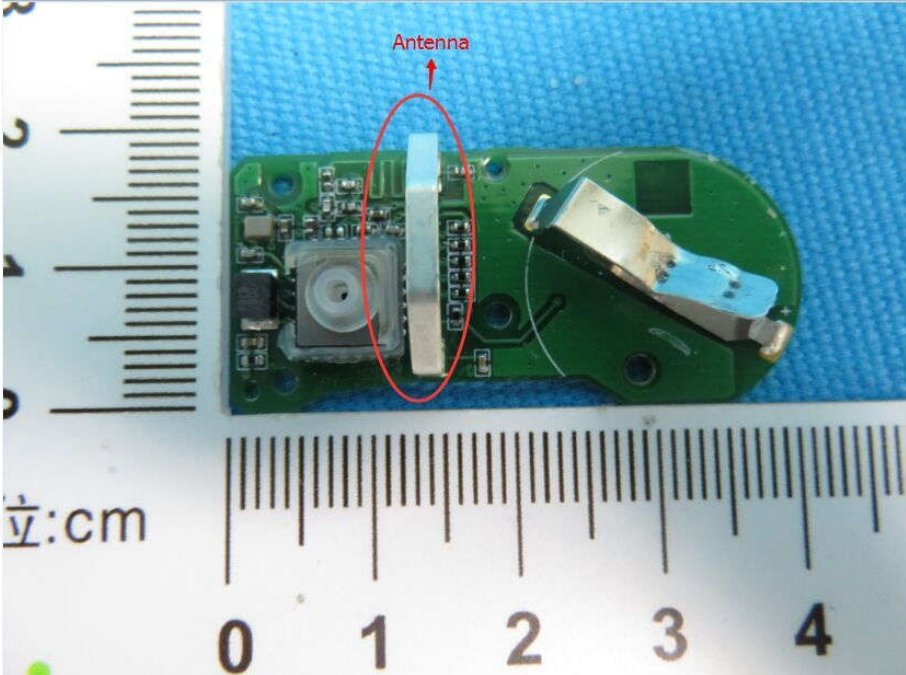
6 Equipment List

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	TTE20130797	06-05-2016	06-05-2019
TRIALOG Broadband Antenna	SCHWARZBECK	VULB9163	9163-484	05-23-2016	05-22-2017
Microwave Preamplifier	Agilent	8449B	3008A02425	02-16-2017	02-15-2018
Horn Antenna	ETS-LINDGREN	3117	00057407	07-20-2015	07-18-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Spectrum Analyzer	R&S	FSP40	100416	06-16-2016	06-15-2017
Receiver	R&S	ESCI	100435	06-16-2016	06-15-2017
LISN	schwarzbeck	NNBM8125	81251547	06-16-2016	06-15-2017
LISN	schwarzbeck	NNBM8125	81251548	06-16-2016	06-15-2017
Signal Generator	Agilent	E4438C	MY45095744	03-14-2017	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2017	04-26-2018
Communication test set	Agilent	E5515C	GB47050534	03-14-2017	03-13-2018
Cable line	Fulai(7M)	SF106	5219/6A	01-11-2017	01-10-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5217/6A	01-11-2017	01-10-2018
Communication test set	R&S	CMW500	152394	03-14-2017	03-13-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	TTF20120439	01-11-2017	01-10-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	003	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	TTF20120434	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	TTF20120435	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	TTF20120436	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	TTF20120437	01-11-2017	01-10-2018

RF Conducted test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	R&S	FSP40	100416	06-16-2016	06-15-2017
Receiver	R&S	ESCI	100435	06-16-2016	06-15-2017
Signal Generator	Agilent	E4438C	MY45095744	03-14-2017	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018

7 Test results and Measurement Data

7.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
15.203 Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
	
Result: Internal antenna is used. It is permanently attached antenna and not be replaced by user.	

7.2 Spurious Emissions

7.2.1 Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10

Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

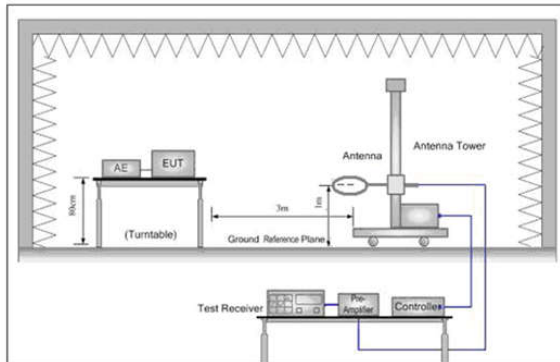


Figure 1. Below 30MHz

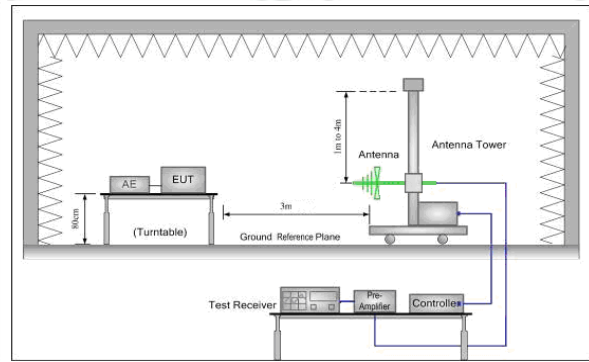


Figure 2. 30MHz to 1GHz

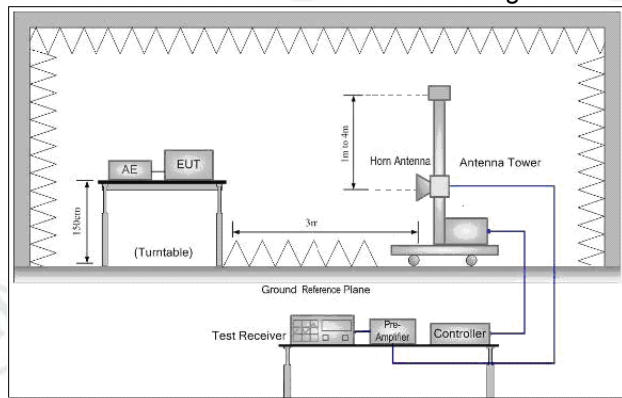


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- h. b. Test the EUT in the lowest channel ,middle channel, the Highest channel
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
- j. Repeat above procedures until all frequencies measured was complete.

Frequency	Limit (dBµV/m @3m)	Detector
30MHz - 10 th harmonics	55.62	Average
	75.62	Peak

Limit:

(Spurious Emissions)

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Frequency	Limit (dBµV/m @3m)	Remark
315MHz	75.62	Average Value
	95.62	Peak Value

Limit:

(Field strength of the fundamental signal)

Test mode:

TX mode

Instruments Used:

Refer to section 6 for details

Test Results:

Pass

Test data

Field Strength Of The Fundamental Signal

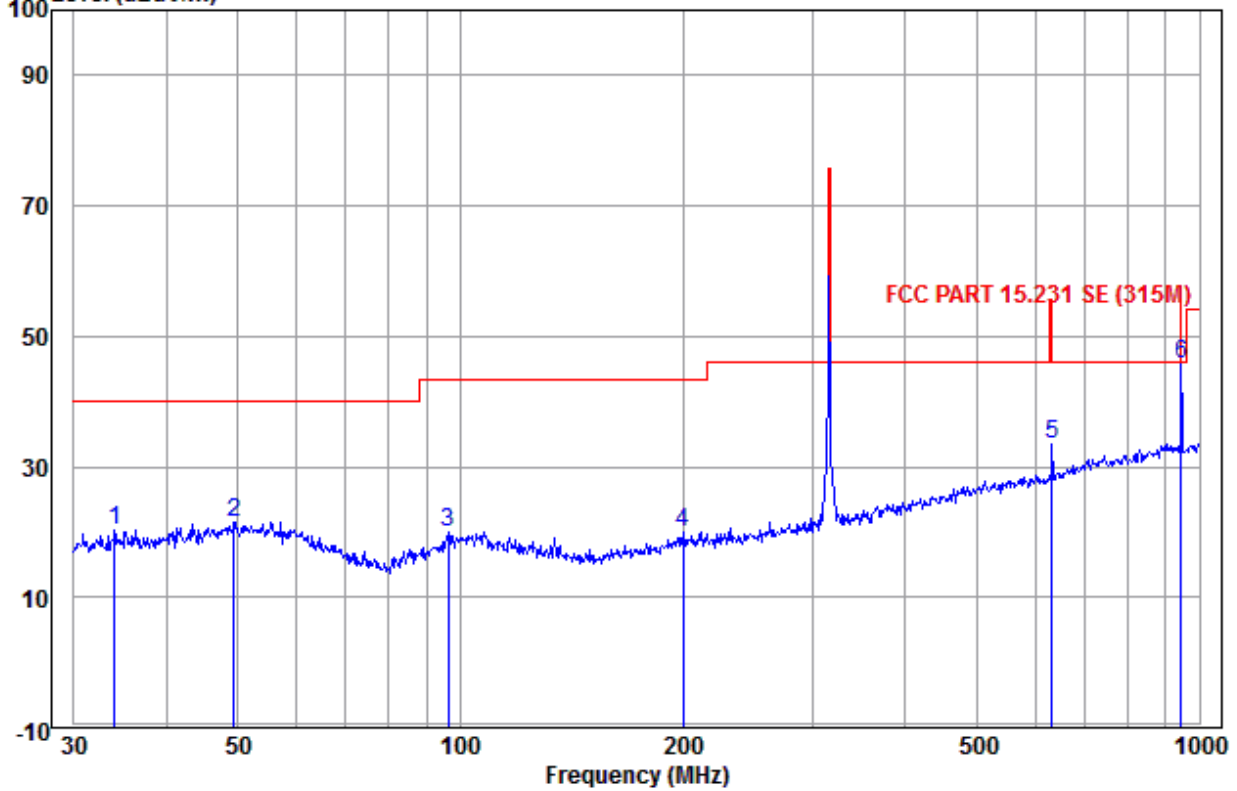
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dB μ V)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Over Limit (dB)	Polarization
315	13.92	2.49	42.85	59.26	75.62	-16.36	Horizontal
315	13.92	2.49	39.5	55.91	75.62	-19.71	Vertical

Spurious Emissions

30MHz-1GHz

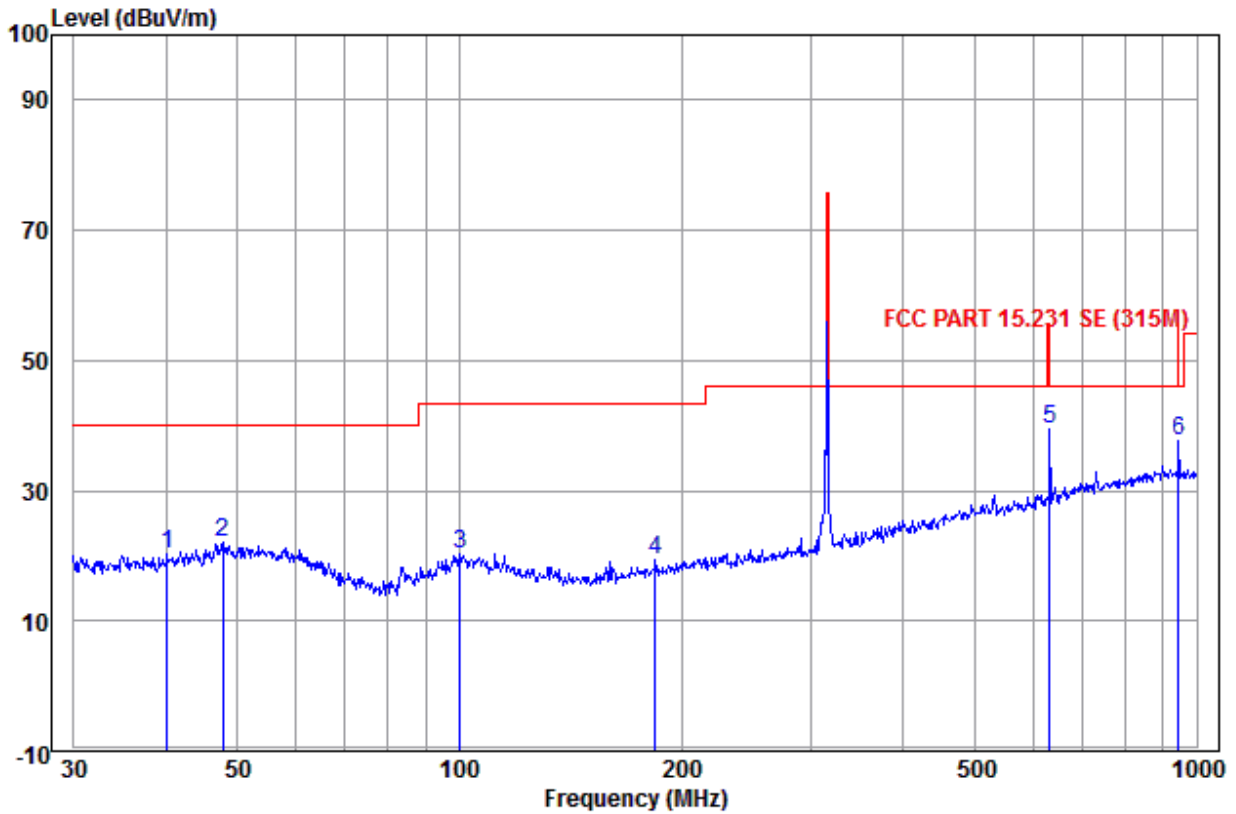
QP value:

Horizontal
Level (dBuV/m)



1	34.037	13.25	0.90	20.38	40.00	-19.62	Horizontal
2	49.359	15.05	1.35	21.54	40.00	-18.46	Horizontal
3	96.436	12.51	1.58	19.85	43.50	-23.65	Horizontal
4	199.986	11.60	2.21	20.12	43.50	-23.38	Horizontal
5	631.688	19.31	3.55	33.42	55.62	-22.20	Horizontal
6 pp	945.440	22.40	4.32	45.85	55.62	-9.77	Horizontal

Vertical



1	40.135	14.21	0.54	20.32	40.00	-19.68	Vertical
2	47.826	14.92	1.23	21.99	40.00	-18.01	Vertical
3	100.229	13.18	1.57	20.23	43.50	-23.27	Vertical
4	184.490	11.07	2.03	19.32	43.50	-24.18	Vertical
5	pp 631.688	19.31	3.55	39.58	55.62	-16.04	Vertical
6	945.440	22.40	4.32	37.52	55.62	-18.10	Vertical

Above 1GHz

Peak value:

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB μ V)	Level (dB μ V/m)	Average Limit (dB μ V/m)	Over Limit (dB)	Polarization
1260.000	30.37	2.58	34.90	45.51	43.56	75.62	-32.06	Horizontal
1575.000	31.00	2.89	34.61	43.56	42.84	74.00	-31.16	Horizontal
1890.000	31.54	3.15	34.37	43.71	44.03	75.62	-31.59	Horizontal
3283.018	33.35	5.56	34.53	43.58	47.96	75.62	-27.66	Horizontal
4402.500	33.31	5.35	34.53	42.72	46.85	75.62	-28.77	Horizontal
5504.170	35.52	6.30	34.30	41.35	48.87	75.62	-26.75	Horizontal
1260.000	30.37	2.58	34.90	43.46	41.51	75.62	-34.11	Vertical
1575.000	31.01	2.90	34.61	43.47	42.77	74.00	-31.23	Vertical
1890.000	31.54	3.15	34.37	43.42	43.74	75.62	-31.88	Vertical
2425.032	32.60	4.37	34.40	43.72	46.29	75.62	-29.33	Vertical
3018.502	33.58	5.62	34.50	42.61	47.31	75.62	-28.31	Vertical
5297.966	35.35	5.80	34.30	42.84	49.69	75.62	-25.93	Vertical

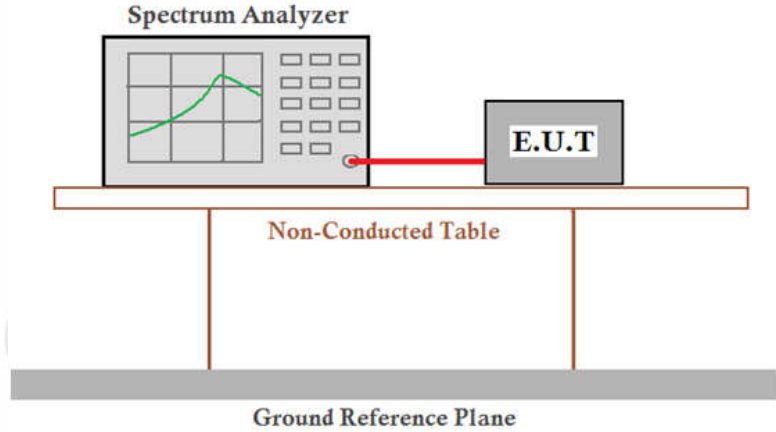
Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:
 Final Test Level = Receiver Reading - Correct Factor
 Correct Factor = Pre-amplifier Factor - Antenna Factor - Cable Factor
- 2) Scan from 9kHz to 8GHz, the disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

7.3 20dB Bandwidth

Test Requirement: 47 CFR Part 15C Section 15.231 (c)
Test Method: ANSI C63.10

Test Setup:



Limit:

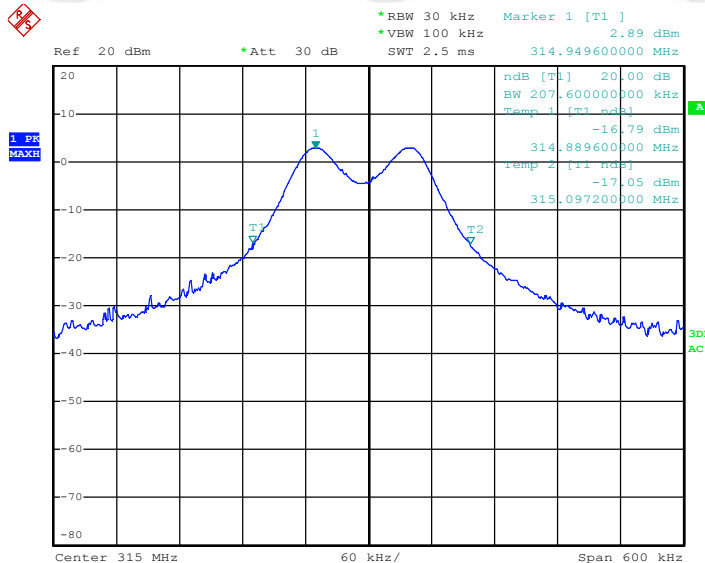
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Mode: TX mode
Instruments Used: Refer to section 6 for details
Test Results: Pass

Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.2076	0.7875	Pass

Test plot as follows:



Date: 17.APR.2017 10:44:09

7.4 Deactivated Time

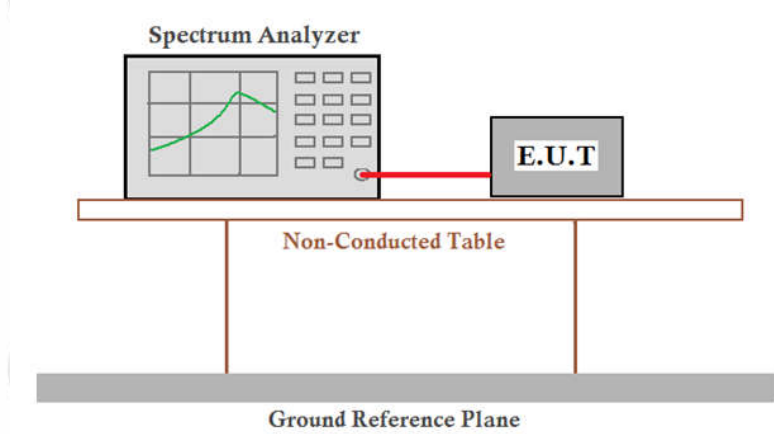
Test Requirement:

47 CFR Part 15C Section 15.231 (a) (2)

Test Method:

ANSI C63.10

Test Setup:



Limit:

Not more than 5 seconds

Test Mode:

TX mode

Instruments Used:

Refer to section 6 for details

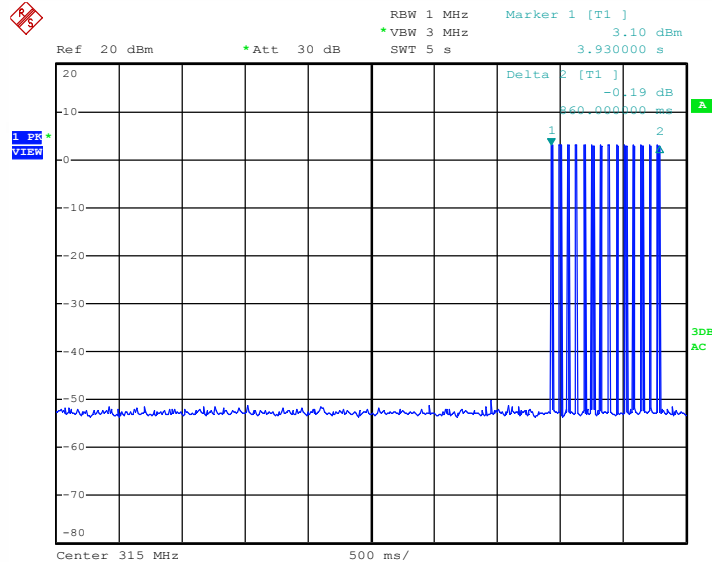
Test Results:

Pass

Measurement Data

Transmitting time	Limit	Results
0.36s	≤5S	Pass

Test plot as follows:

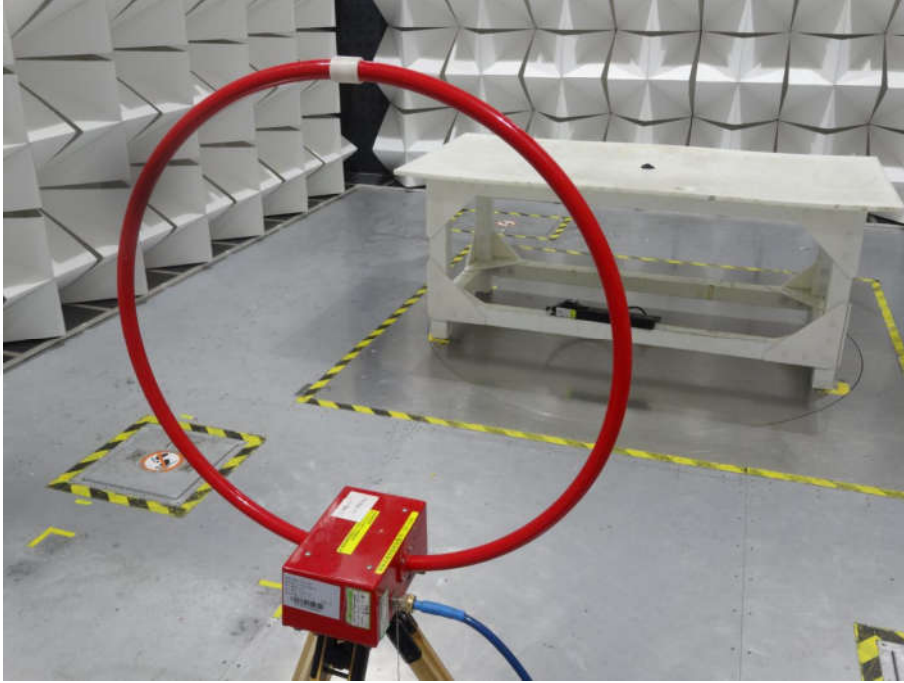


Date: 17.APR.2017 11:06:17

Remark: The transmitting time of the EUT can manual control and automatic control, The two modes had tested and found the automatic control mode was the worse case,only the worst data was reported.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test Model No.: QY1204AC1



Radiated spurious emission Test Setup-1(Below 30MHz)



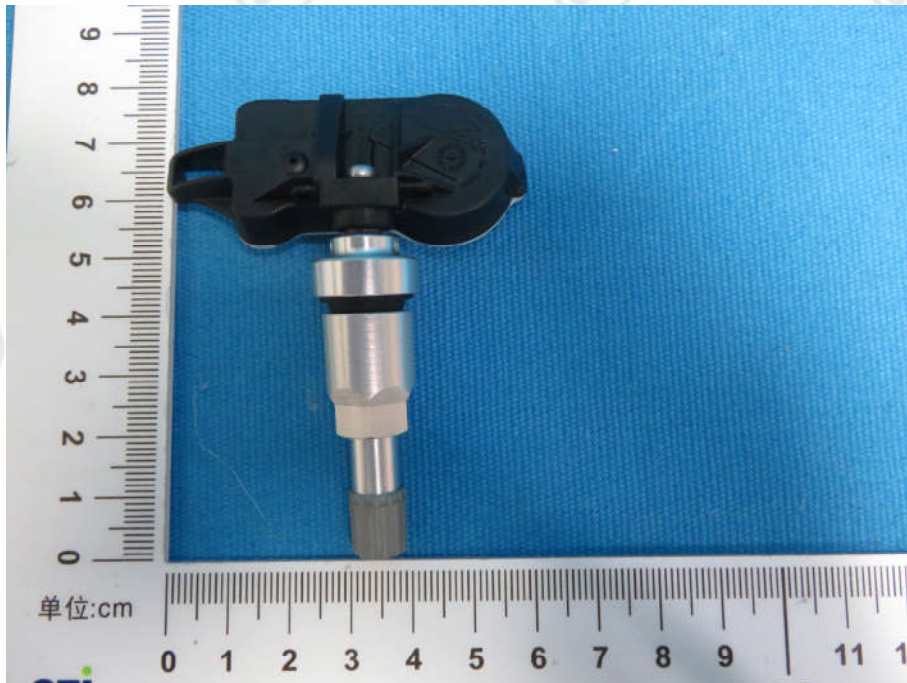
Radiated spurious emission Test Setup-2(30MHz~1GHz)



Radiated spurious emission Test Setup-3(Above 1GHz)

APPENDIX 2 PHOTOGRAPHS OF EUT

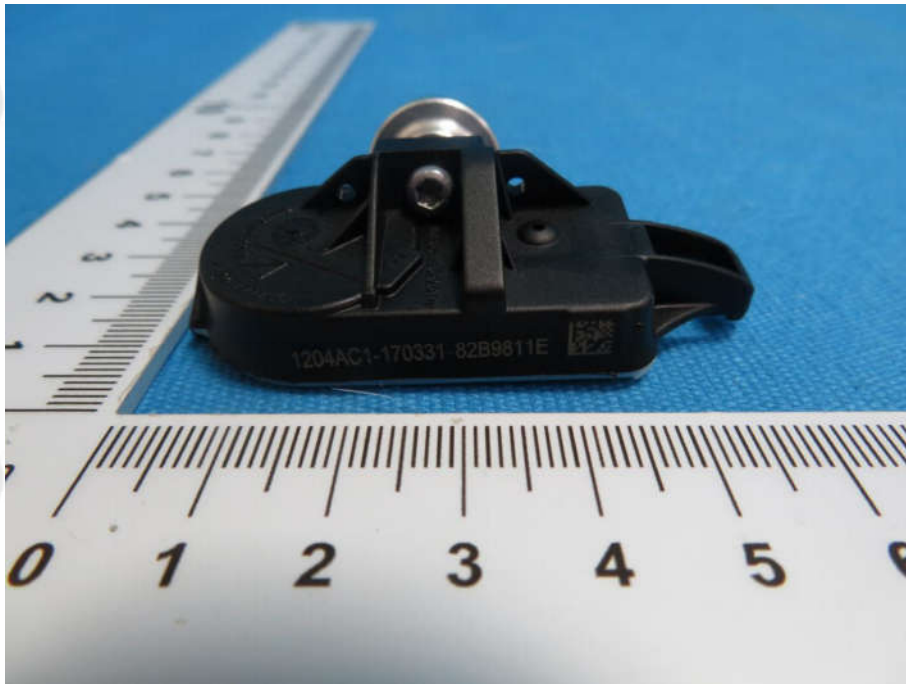
Test model No.: QY1204AC1



View of Product-1



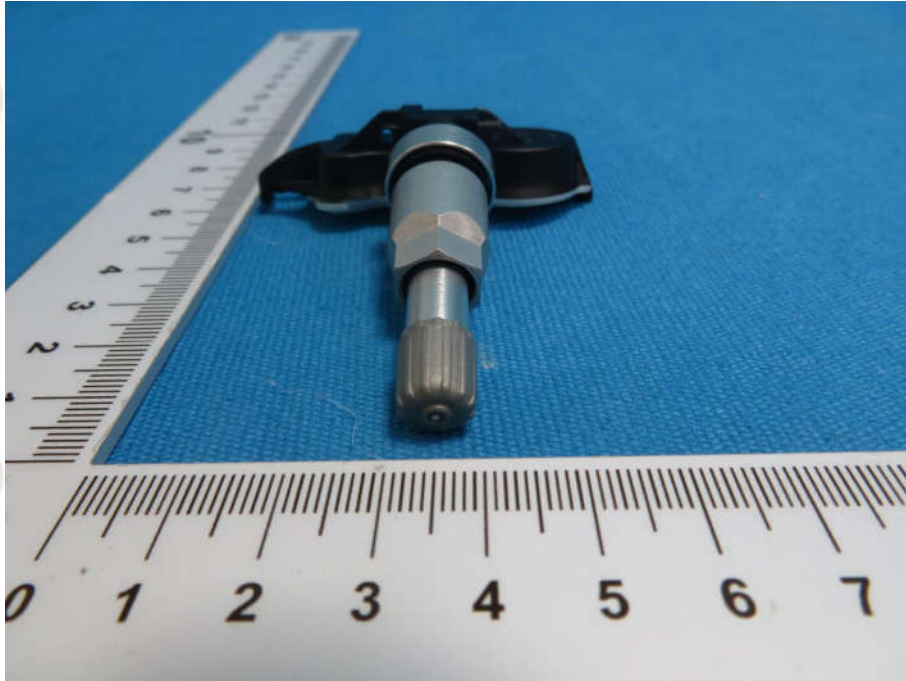
View of Product-2



View of Product-3



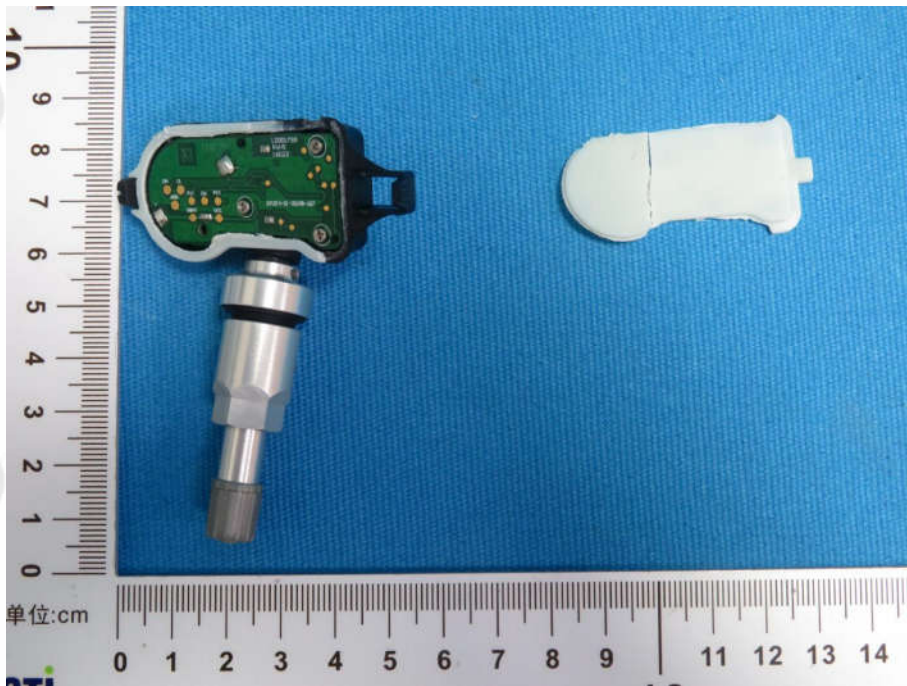
View of Product-4



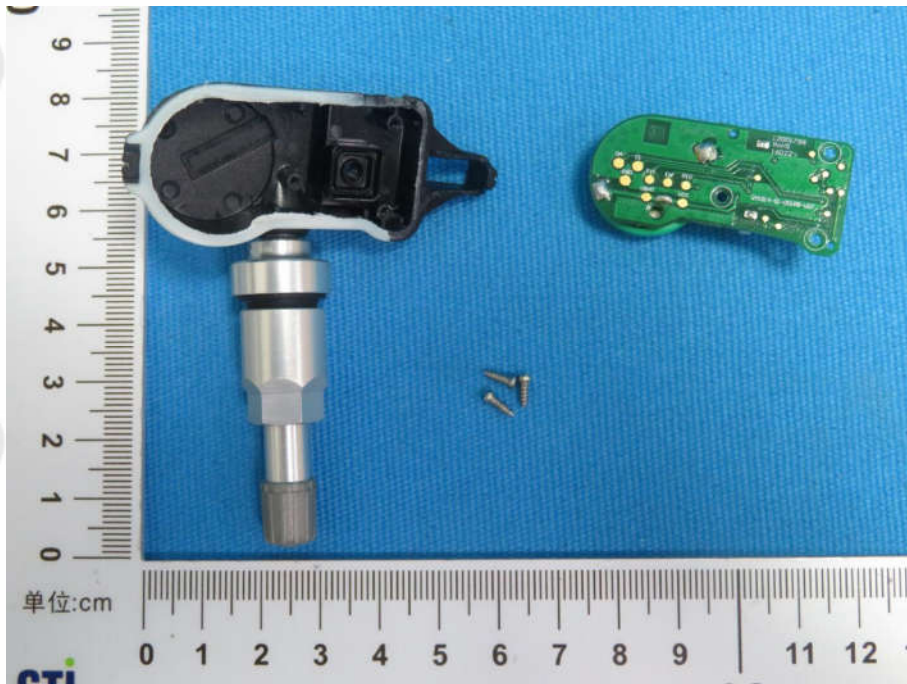
View of Product-5



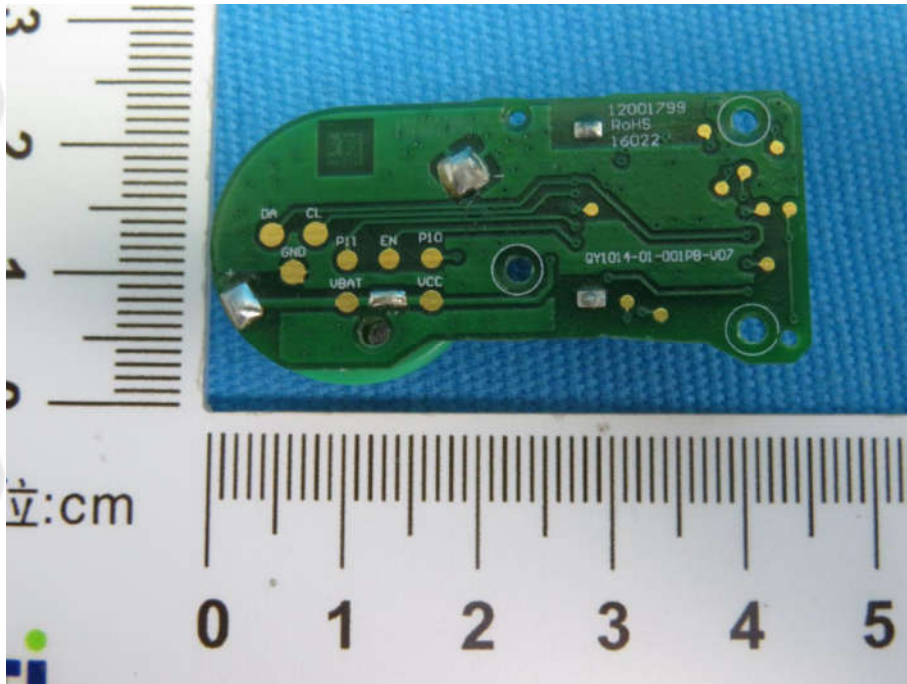
View of Product-6



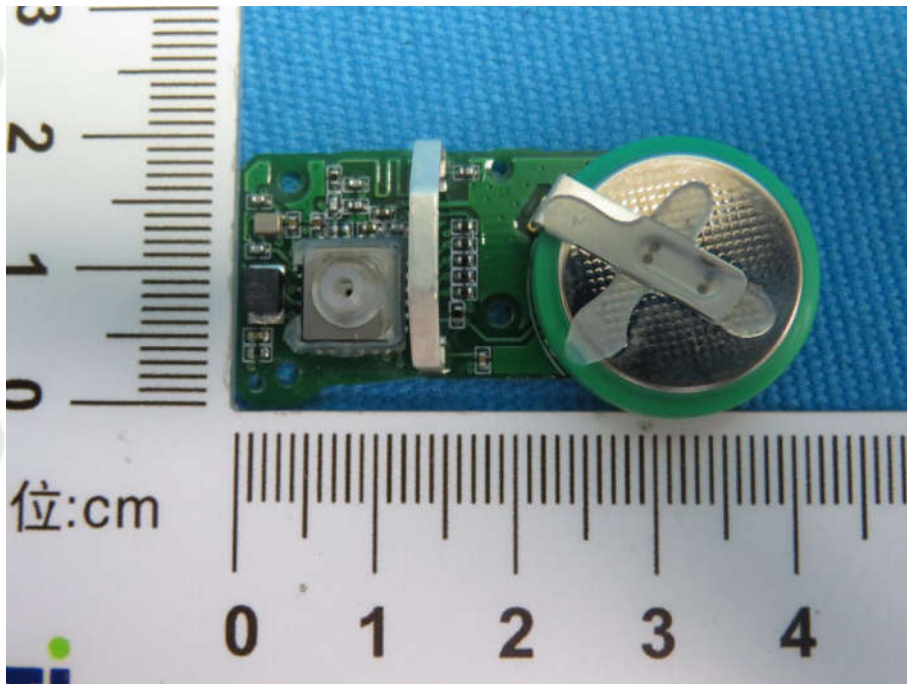
View of Product-7



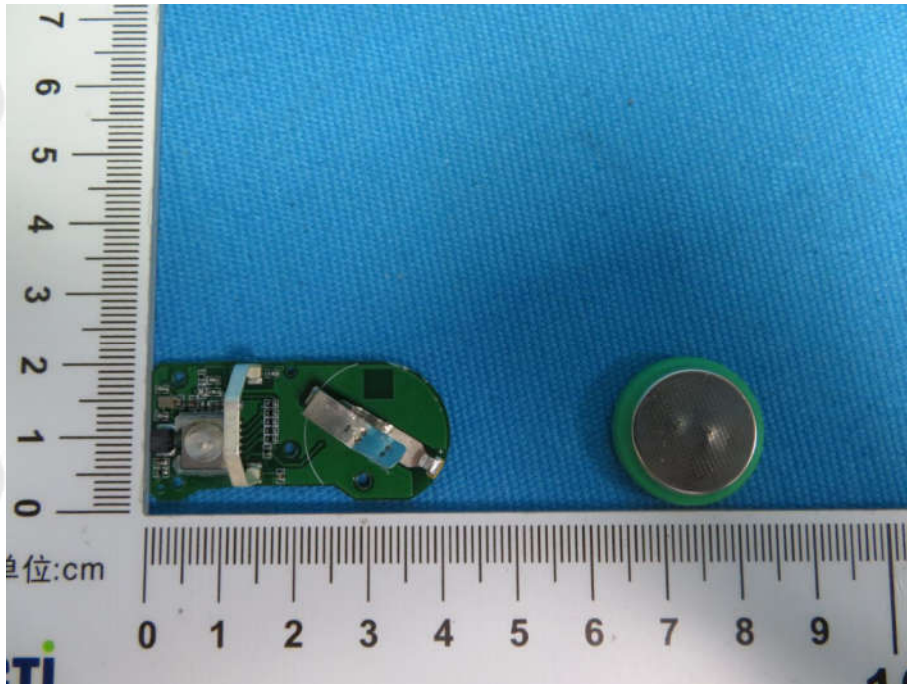
View of Product-8



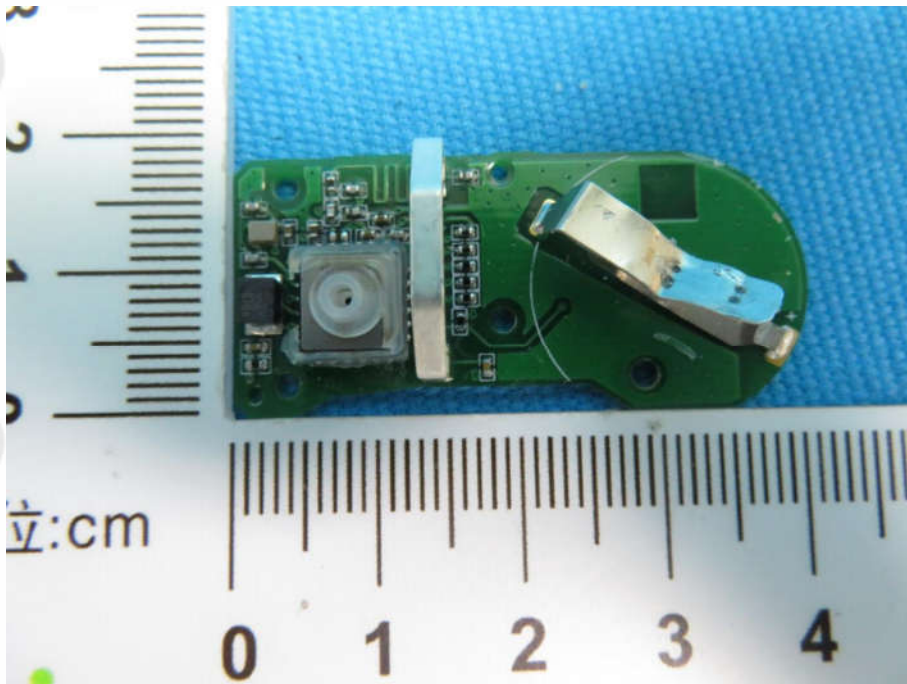
View of Product-9



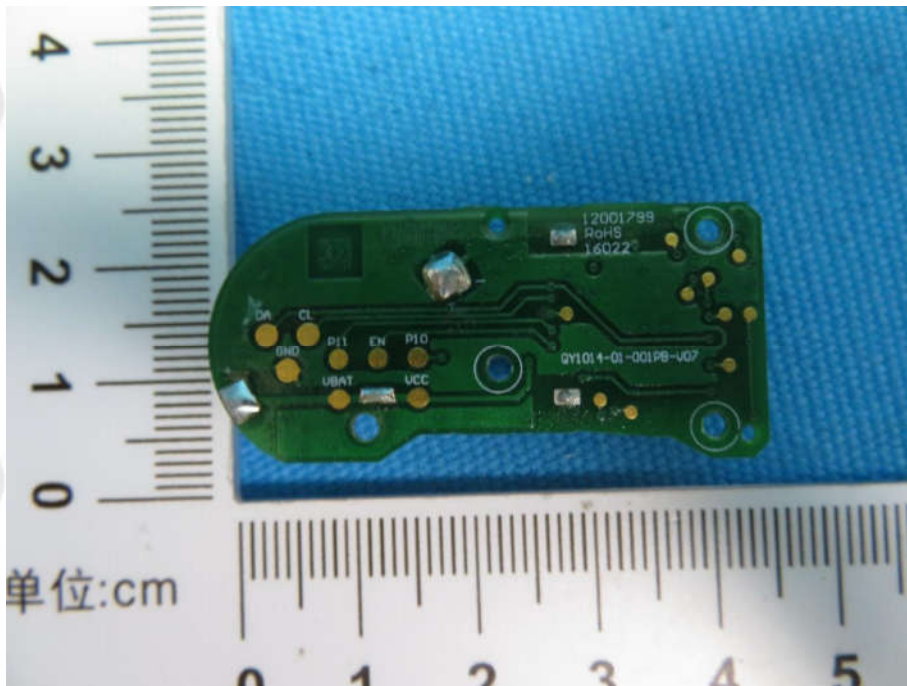
View of Product-10



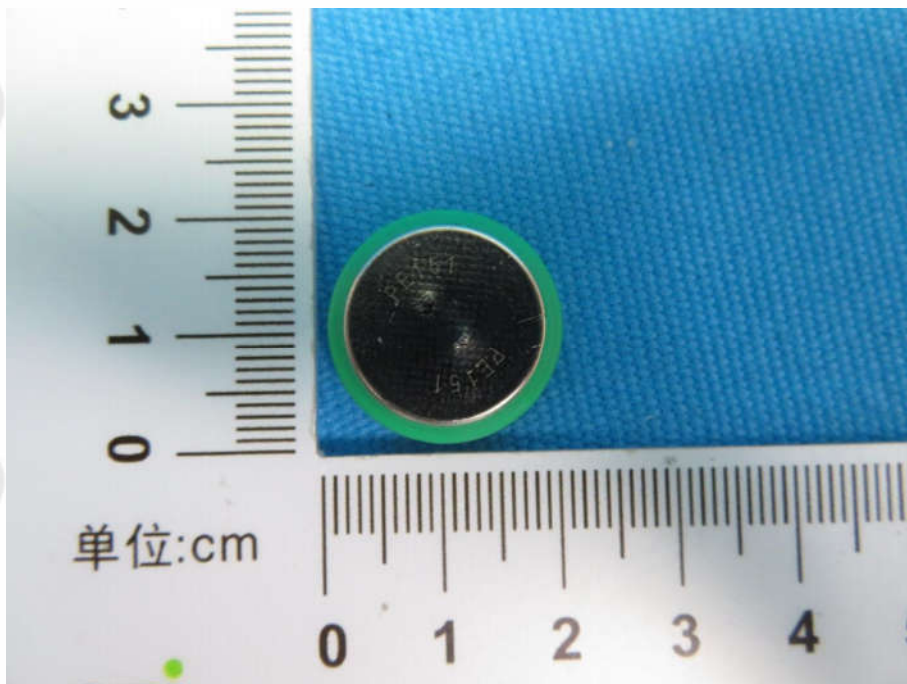
View of Product-11



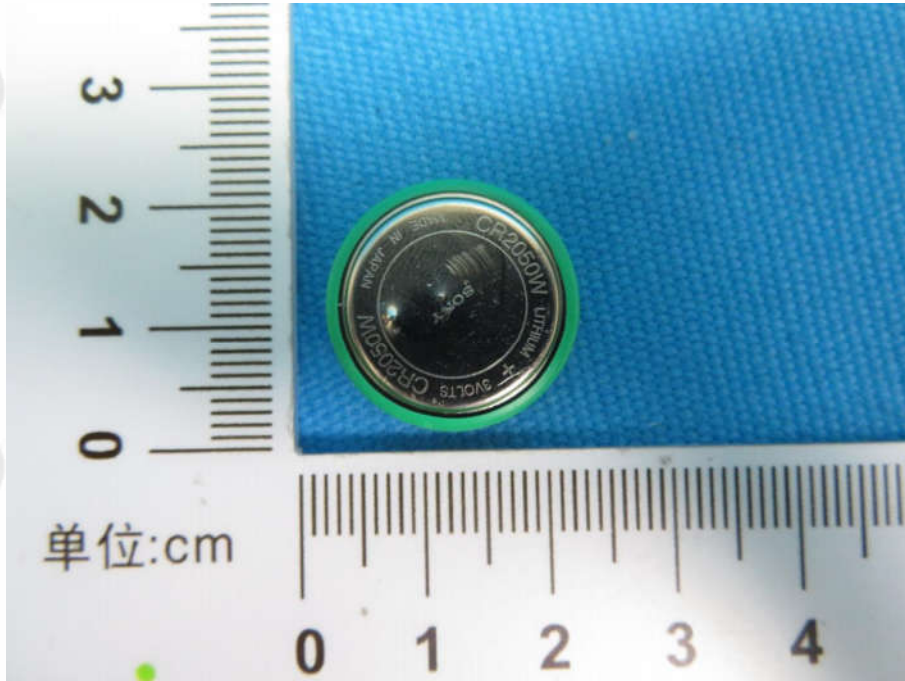
View of Product-12



View of Product-13



View of Product-14



View of Product-15

*** End of Report ***

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